

## How to keep workers safe from COVID-19: Focus on the air they breathe

The growing evidence for airborne transmission of COVID-19 is now widely known by the medical community. Why has that message not, for the most part, trickled down to some provinces, public-health units, and employers' workplace safety guidelines?

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The Amazon Fulfillment Centre in Brampton, Ont., on April 20, 2021.

FRED LUM/THE GLOBE AND MAIL

In Saskatchewan, sharing pens in the workplace is discouraged. In Newfoundland, workers are told to avoid handling money, while in B.C., they're encouraged to disinfect common surfaces such as light switches.

What few provinces mention in much detail in their advice to employers about preventing COVID-19 is the air workers breathe.

Canada has a patchwork of guidelines on how to keep workers safe in the pandemic. A review of provincial guidance on prevention and safety measures for workers shows that, though wording and approaches differ, most fail to emphasize, or sometimes even mention, the risk of aerosol transmissions (aerosols are tiny particles that can float on indoor air currents, similar to how smoke moves through the air). The majority still emphasize disinfecting surfaces and hand hygiene and play down or ignore the importance of ventilation and air quality. Newfoundland's workplace guidance, for example, mentions hygiene four times and ventilation or air zero times.

At the start of the pandemic, we knew less about how COVID-19 is transmitted. Now, however, with more research and investigations into real-world settings, the evidence has grown. This virus is not, for the most part, transmitted by touching surfaces, nor when workers are outside. The U.S. Centers for Disease Control and Prevention pegs the risk of transmission from contact with a contaminated surface as "low," at less than one in 10,000. The riskier environments are crowded, indoor spaces, with poor ventilation – where scientists say aerosols can build up over time.

In a Canadian Medical Association Journal commentary last week, a group of doctors said ventilation is a "key element" in mitigating against airborne transmission. Canadian public-health guidance and policies, they said, should be updated to address this mode of transmission.

Workers, especially those in warehousing, factories, oil-patch camps, meat-packing plants or warehouses have continually seen outbreaks in their workplaces. And now, with more people set to return to work as restrictions ease, many have not yet been fully vaccinated, while more transmissible COVID-19 variants are increasing. Stronger measures are needed to safeguard workers' health now, and in the future, experts say.

People "are trying really hard. It's just we've pointed them in the wrong direction," says David Fisman, professor of epidemiology at the University of Toronto's Dalla Lana School of Public Health, who is also a member of the Ontario COVID-19 Science Advisory Table and an

infectious disease physician. “They’re cleaning the hell out of everything … spending millions, probably billions of person hours, cleaning surfaces, and it doesn’t change anything.”

Aerosol scientist Dr. Linsey Marr at Virginia Tech.

HANDOUT

The Globe and Mail interviewed 20 experts in fields ranging from engineering to epidemiology, occupational hygiene, aerosol science, public health and microbiology, along with employers and unions about the growing evidence of airborne transmission, and the implications for workplaces.

And yet that message has not, for the most part, trickled down to some provinces, public-health units, and employers. “It seems like Canada has been slower to … recognize airborne transmission and really resistant and almost hostile to the idea,” said Linsey Marr, an engineering professor at Virginia Tech who is considered one of the world’s top aerosol scientists. She calls the evidence on COVID-19 and airborne transmission “overwhelming.”

#### WHERE WE'RE AT

Momentum is building to acknowledge the role of aerosols. After growing pressure from scientists, the World Health Organization (WHO) on April 30 quietly updated its website to say that the virus can spread when people inhale droplets, as well as aerosols. In the United States, the CDC on May 7 revised its guidance, explicitly recognizing airborne spread, saying aerosol particles can remain suspended in the air for minutes to hours, and that transmission can happen to people more than six feet away.

On its website, the Public Health Agency of Canada now includes the risk of aerosol transmission as one of the main modes of transmission; it also provides practical information on how to improve ventilation (open windows and doors where possible; upgrade your filter; consult with a professional).

While the federal government now acknowledges the risks of airborne transmission, many provincial guidelines are outdated, while experts say inspections and enforcement around ventilation measures are scarce. Some employers, meantime, continue to focus on deep cleaning.

In London, Ont., workers at Cargill's chicken-processing plant toil in chilly, 10-degree temperatures to produce chicken nuggets for McDonald's. In mid-April, the company temporarily closed the facility after more than 80 workers tested positive, of a total work force of about 920. Today that number is 135 workers, of which 24 cases are still active.

The shutdown came a year after a Cargill beef slaughterhouse in High River, Alta., had the country's largest outbreak of COVID-19, with more than 900 workers sickened and three deaths. Cargill has seen numerous outbreaks since last spring, and so have other meat-packing plants.

Cargill reopened its London plant the following week, after a "deep cleaning, removing the microwaves and closing the locker rooms," it said in an e-mail. This was in addition to other safety protocols that include installing Plexiglas, additional sanitization at night, temperature checks and screening questions.

What it hasn't done – which the UFCW union representing workers has asked for – is to slow the production line to allow for more physical distancing.

In its statement to The Globe, the company also didn't say whether it changed ventilation practices. Cargill said it now provides surgical masks to staff, but didn't mention more protective face coverings such as N95 respirators.



The Cargill meat-packing plant where there was an outbreak of COVID-19, which affected the meat supply chain, in High River, Alta., on May 6, 2020.

TODD KOROL/REUTERS

The local London Middlesex public-health unit said ventilation was not identified as a risk factor. Its guidance focused on distancing in the lunch rooms and in the washrooms, said Chris Mackie, medical officer of health.

Across Canada, meat-packing plants have had more than 5,000 cases of COVID-19, and 15 fatalities as of mid-April, according to the Public Health Agency of Canada – making it by far the sector with the highest case counts of any industrial setting.

They typically have all the ingredients that spur transmission of the virus: a cold environment, people working at close quarters, noisy machinery, so people have to speak more loudly. Add to that, a lack of ventilation – much like a fridge, these plants are made to keep cold air in, and fresh air out.

They are, notes Stéphane Bilodeau, a Sherbrooke-based mechanical engineer with a PhD in ventilation, a “soup of aerosol.”

Across Canada, though there have been scores of workplace investigations into COVID-19 outbreaks, public-health units and ministries haven't released much information about the results, nor on precisely how transmissions are happening and what's being done to prevent them. The reason often cited is privacy, but the lack of transparency has hampered efforts to design safer work sites, prevent infections and build awareness around risks.

Earlier this year, an outbreak at a MegaFitness gym in Quebec City resulted in 226 people infected. The regional health network told The Globe it looked at ventilation as part of its investigation. It wouldn't say, however, whether aerosol transmission played a role, saying epidemiological investigations are "confidential."

Generally, gyms "could be a setting that is ripe for an outbreak with aerosol," because there are many people, doing strenuous exercise, breathing rapidly, and expelling more air, said Raymond Tellier, a physician and medical microbiologist at McGill University. "And if the ventilation does not keep out, you have all the ingredients for a super-spreading event that is driven in large part by aerosol transmissions."

Hamilton had another super-spreader event, tied with a spin fitness studio. An outbreak in October led to 54 primary cases and 31 secondary cases. The City of Hamilton Public Health Services said it doesn't know exactly how the virus spread. It recommended ensuring its HVAC system is well maintained, but issued no orders.

### **WHAT WE'VE LEARNED**

Last month, an article by 39 scientists in the journal Science called for a "paradigm shift" to prevent indoor respiratory infection, such as COVID-19 and influenza. Tackling this – like reducing waterborne or foodborne disease – is a "tractable problem," they said. But it requires new standards, ventilation guidelines and regulations. It might mean, for example, wider use of monitors that display air-quality measures to the public and to workers, and ventilation certificates, similar to food hygiene certification for restaurants.

For Dr. Tellier, taking measures now will better prepare us for the next time. "It will come again. I can assure you," he said. "There are other viruses, some of them far more dangerous than the COVID coronavirus."

When the pandemic first hit, it was uncertain, initially, just how the virus was transmitted.



Ralph, one of the maintenance employees, disassembles the HEPA filters in preparation to mounting the HEPA filtered ventilation systems at Saint-John Fisher Senior Elementary School in Pointe-Claire, a burrough in Montreal on Dec. 01, 2020.

ANDREJ IVANOV/THE GLOBE AND MAIL

A growing body of evidence – including studies of cruise ships, choir gatherings, restaurants, fitness classes, slaughterhouses, long-term care homes, quarantine hotels and prisons – were suggesting airborne transmission played a key role.

There are still knowledge gaps, including about the dose of the virus that can cause an infection, and exactly how much of a role airborne transmission has played.

In the absence of perfect knowledge, given that people's lives are at stake, some urge the use of the precautionary principle, which says to err on the side of caution until more is known, as recommended in 2006 by Ontario's SARS commission.

Workplace settings differ, and there's not a one-size-fits-all solution to better air. But PHAC recommends improving air quality by drawing more air from outside, and reducing recirculated air, and ensuring good quality filters. Where and when possible, windows and doors should be opened regularly. In cases where it's hard to improve ventilation, and after consultation with an expert, HEPA filters can lower the concentration of some viruses in the air.

Many schools have focused on this over the past year, where it's become the norm to introduce measures to improve ventilation, such as opening windows, testing classroom air quality and installing air purifiers.

## **GUIDANCE**

Back in January, 363 experts signed an open letter that urged premiers and public-health officials to take aerosol transmission of COVID-19 more seriously. Jennifer McDonald, an Ottawa-based rehabilitation physician, was one of the signatories.

Canada hasn't done enough to recognize the risk of airborne transmissions inside workplaces, nor to prevent these outbreaks from happening, she said.

"The size of the outbreak could certainly be decreased if we considered mitigation strategies against airborne transmission," she said. "It would be nice if the employers took this on themselves, and just did it – put the money in for better quality masks, in the form of respirators, better ventilation assessments and filtration of the air. However, it's hard to blame them when the provincial guidelines aren't actually telling them to do that."

At the national level, the Public Health Agency of Canada has updated guidelines and now provides employers with more information about ventilation. But these revisions have not necessarily flowed down to the provincial or local level.

Saskatchewan, for example, has a COVID-19 workplace information sheet, which advises people to disinfect pens and office equipment after each use. Its four-page guideline mentions cleaning and disinfecting eight times and ventilation or air zero times.

## **Publicly reported COVID-19 deaths in industrial settings in Canada**

Meat production/ packing facility	15
Worker camp (e.g. mining, gas, oil, forestry)	6
Agricultural production/ farming	4
Distribution/processing facility	3

Industrial setting (other/unspecified)	3
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DATA AS OF MAY 14, 2021

THE GLOBE AND MAIL, SOURCE: PUBLIC HEALTH AGENCY OF CANADA

### **Publicly reported COVID-19 cases in industrial settings in Canada**

Meat production/ packing facility	5,235
Worker camp (e.g. mining, gas, oil, forestry)	4,354
Agricultural production/ farming	2,264
Industrial setting (other/unspecified)	1,921
Distribution/processing facility	1,323

DATA AS OF MAY 14, 2021

THE GLOBE AND MAIL, SOURCE: PUBLIC HEALTH AGENCY OF CANADA

WorkSafe BC's main safety plan for employers has little on ventilation and doesn't mention "air."

Other provinces have scant or outdated information. Newfoundland's safety sheet for the oil and gas sector, last updated in May, 2020, actively discourages workers from wearing medical masks. It says that when physical distancing isn't possible, Plexiglas is preferred (experts note that aerosols can float over, around or under plastic partitions).

The Globe asked several provincial governments whether they plan on updating or adding to their guidance on ventilation. Newfoundland and Labrador's government noted that there are no overarching sections or pages on ventilation or air quality, though there are some references for some subsectors. Saskatchewan said that ensuring adequate ventilation to protect workers is already covered under its occupational health and safety regulations. WorkSafe BC said it will collaborate with its provincial health officer in looking at future safety plans. Both B.C. and Ontario now have some information about ventilation.

“Whether it’s inspectors going into facilities, or guidelines that are published, you don’t see much” around aerosol precautions such as proper ventilation and filtration, said Dr. Bilodeau, who is also a fellow of Engineers Canada. “It’s all about cleaning hands, staying at two metres, social distancing,” when what should be added is that aerosols can linger longer and go further than originally thought.

Sometimes, curbing the risks can be fairly simple, he added – for example, for buildings built to code in the past 20 years, improvements can come from checking fresh-air intakes and making sure they’re fully open and clean, and minimizing recirculated air.

### **WHERE WE COULD BE**

The jolt for Roger Yang came with news of a study from China: One customer infected nine others at a restaurant. Then there was news of a choir in Washington last spring, which became a super-spreader event.

The owner of Avelo restaurant and now Pizzeria Du in Toronto set out to learn how to prevent transmission in his own establishments and keep people safe. “Clearly, it’s in the air,” he says.

“I was really disappointed that the messaging from our government wasn’t much more clear on this from much, much, much earlier on – like simple things that could have been done to minimize risk in so many places, like just opening windows.”

He kept front and back doors open; asked an engineer to test the air, and learned that the kitchen hood does a good job sucking up huge amounts of air. He installed acrylic dividers – not regular four-feet ones, but eight feet to the ceiling to partition tables; in each section he has an air cleaner. Back when Avelo was open, he only had three tables at a time.

The measures cost about \$5,000 in materials and labour per establishment, he estimates. “I wouldn’t say it’s unduly expensive,” he says. “It would be more expensive to not take precautions. If there was an outbreak, and several of the staff got infections and possibly some of their customers as well that would be far, far worse than \$5,000 for some Plexiglas and some air cleaners.”



Awai Hospitality founder Roger Yang at his restaurant Avelo, on Sept 30 2020.

FRED LUM/THE GLOBE AND MAIL

The efforts built trust among customers, and reduced anxiety for staff. “We got many, many notes from customers, saying that this is the only place that they would feel safe eating at. Many people appreciate the level of caution that we’re taking, and from staff, as well, everyone’s happy that they’re not in a high-risk situation.”

As economies reopen, workplaces could stop doing some things and start doing others. This means emphasizing ventilation and de-emphasizing frequent deep cleaning and disinfecting, which require heavy chemicals that carry their own health risks, said Michael Brauer, public-health professor at the University of British Columbia. And stop investing in more Plexiglas dividers, which don’t protect against aerosols wafting over and under them, he said.

Eat lunch outside, open windows and doors if possible, and adjust existing systems to allow more fresh air intakes. Canada could support more research on super-spreading events and outbreaks; make investigations and data more publicly accessible, and publicize success stories, best practices and what workplaces can learn from one another.

Some measures are costly, though investments should be weighed against the risks of inaction, with potential shutdowns, reputational damage and impacts on workers’ health.

And some simple steps can make a big difference, said Dr. Bilodeau, such as making sure a fresh air intake is open and not blocked and switching to a higher-grade filter, such as a MERV

### 13. Maximize getting air from the outside and minimize recirculation.

Involving experts such as engineers and occupational hygienists – who are trained to identify and control health hazards in the workplace – can better inform policies, the CMAJ article says, in areas such as ventilation and masks.

Pressure to change could come from the courts. In a recent ruling, a Quebec court in March determined that health care institutions should have applied the precautionary principle, given risks of airborne transmissions of the virus, and provided staff with N95s. Now, the province is updating its guidance, to reflect the ruling, which will require more access to N95 masks.

Here's what it can look like when risks around airborne transmission are taken seriously.

There are few seemingly scarier workplaces in the past year than at the dentist's office. Work at close quarters. No masks on clients. Small rooms. Open mouths and loads of sprayed particles.

When the pandemic hit, the sector introduced all kinds of new measures – air quality assessments that monitor air changes each hour; fallow time between patients; air purifiers; N95 masks and more personal protective equipment (including gowns and face shields); use of high-volume suction to reduce aerosols; walled off rooms to make sure aerosols don't leave the area.

"Research has shown that a lack of ventilation, poor air quality do lead to an increase in transmission," says Donna Wells, manager of professional practice at the Canadian Dental Hygienists Association, which has 20,000 members. "It's not just one thing, but all of the infection control protocols in place combined that have shown to be effective."

Over the course of the pandemic, Ontario has had more than 500,000 cases of COVID-19. Among dental hygienists in the province, she said, the estimated total number of cases acquired in the workplace is five.

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